

## DEVELOPMENT OBJECTIVES

### OPTICAL EQUIPMENT TEST KIT

#### 1. INTRODUCTION

These development objectives describe the requirements to be met in the design and development of a prototype Optical Equipment Test Kit. Portability, general usefulness, and ease of component replacement are primary considerations.

#### 2. GENERAL DESCRIPTION

This Optical Equipment Test Kit will include those devices commonly and conveniently used during field testing of equipments developed for the purpose of viewing photographic imagery. Such equipments include: microstereoscopes, stereomicroscopes, light tables, projection viewers, and ~~the~~ tube magnifiers. Presently, the technical officer monitoring a development contract must collect a miscellaneous assortment of devices such as resolution targets, reticles, and scales in order to field test the performance of an instrument. The purpose of the Optical Equipment Test Kit is to provide a readily portable collection of testing devices for field use during the monitoring of development contracts. It is not the intent that these devices will be capable of the precision of laboratory measurements. In many cases, such as certain optical aberrations, it is sufficient to indicate qualitatively that an anomaly exists. In other cases,

such as optical resolution, a more quantitative readout is possible. How quantitative the devices are to be is a trade off between convenience, availability, accuracy, and cost. In all cases, the devices may be either readily available as purchaseable items, or may be specially developed and produced.

### 3. REQUIREMENTS

#### 3.1 Optical Measurements

The Optical Equipment Test Kit will include devices for determining such optical quantities as field of view, magnification, resolving power (up to 2000 lines per millimeter), astigmatism, field curvature, pin cushion/barrel distortion, and image rotation run-out. It is envisioned that these devices will be a collection of targets, grids, and reticles, either on film or glass substrates. It is expected that some of these devices will be viewed in the object space of the optics being tested and other devices will be viewed in the eyepiece image plane of the optics being tested. Eyepiece devices should fit a standard Bausch & Lomb 10X wide-field eyepiece, and the eyepiece itself should be calibrated with respect to magnification. Also, some simple form of auxiliary telescope should be included that can be used over the eyepieces of optical systems so as to ensure that resolution readings are limited by the capabilities of the optical system and not limited by the observers eye.

### 3.2 Physical Measurements

The Optical Equipment Test Kit will include devices for determining such physical quantities as length, height, temperature, and vibration. These devices would include common English machinists scales, a measuring tape, small internal and external calipers, and a simple depth gage. Some type of contact thermometer to measure surface temperatures up to 300 F should be included. Also, some type of reticle or target should be included that would indicate the magnitude of mechanical vibration. The intent of this requirement is to view the reticle or target with magnification and be able to determine the magnitude of the vibrations of the surface on which the reticle or target rests. In addition, grids should be included that would allow checking the accuracy of linear translations and allow checking of orthogonality of an X-Y translation system.

### 3.3 Miscellaneous Measurements

The Optical Equipment Test Kit will include miscellaneous devices to aid the checking of development equipment. Neutral density filters of 1.0, 1.5, and 2.0 density should be included. A density step wedge of 0.05 to 3.05 density with 21 steps of 0.05 increments is required. In addition, a controllable light source of minimum dimensions is required that can be placed under optics and serve as a source of illumination.

### 3.4 Manual

If necessary, a manual should be included in the package to describe the intended use of the devices, give some indication of the probable accuracy of measurement, and outline procedures required for the proper use of the devices.

### 4. COST REQUIREMENTS

A cost estimate will be submitted for the production of quantities of 5, 10 and 20 units of the Optical Equipment Test Kit.